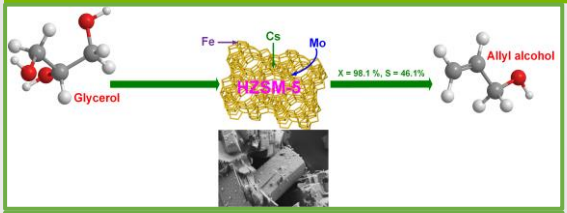
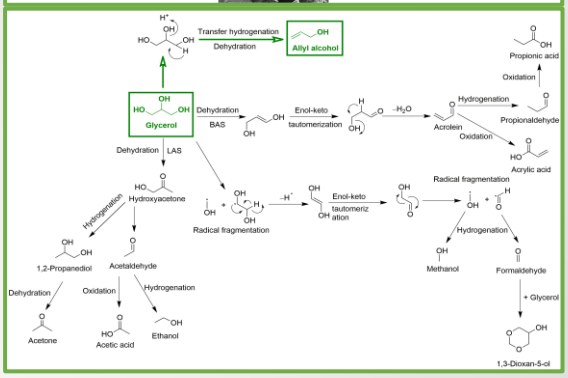
NATIONAL INSTITUTE OF CHEMISTRY

RESEARCH DOMAINS: Heterogeneous catalysis engineering

INDUSTRIES: Biodiesel, pharmaceutical, production chemicals with high added value

SUSTAINABLE PRODUCTION OF ALLYL ALCOHOL: GAS-PHASE CONVERSION OF GLYCEROL OVER METALS PROMOTED ALUMINOSILICATE ZEOLITE CATALYSTS IN A FIXED-BED CONTINUOUS FLOW REACTOR





Allyl alcohol is an industrially important substance, mostly used for the production of chemical intermediate in organic synthesis. Current industrial processes for the production of allyl alcohol are fossil fuel-based routes from hydrogenation of propylene-derived acrolein or propylene oxide isomerization. In addition, the allyl alcohol can be produced by the catalyzed acetoxylation of propylene over noble metal catalysts. All these methods have many disadvantages such as environmentally unfriendly route, multistep synthesis, unsustainable process, expensive and toxic feedstocks. These disadvantages in the current industrial processes have stimulated researchers to develop new sustainable routes for production of allyl alcohol from glycerol. Nowadays, there is no industrial process for the large-scale production of allyl alcohol from glycerol. The market size of allyl alcohol is 0.1 Mt/year with price 2.2-3.2 USD/kg, making it much more commercially attractive in comparison to glycerol (0.1-0.6 USD/kg).

TYPE OF COOPERATION

R&D cooperation and technology licensing opportunity

INTELLECTUAL PROPERTY

EP20171606

DEVELOPED BY

Department of Catalysis and Chemical Reaction Engineering

CONTACT

Knowledge Transfer Office
P: 00386 1 4760 529
E: knowledge.transfer@ki.si

MORE INFORMATION ABOUT THE INVENTION

Technology

The present invention relates to the use of a tri-metallic promoted aluminosilicate zeolite catalyst for the direct gas-phase conversion of glycerol to allyl alcohol, as well as to a process for the production of allyl alcohol from glycerol in a fixed-bed continuous flow reactor in the presence of such heterogeneous catalysts. The method comprises conversion of glycerol to allyl alcohol in the range of temperature 250-450 °C, glycerol concentration 1-60 wt%, total gas hourly space velocity 100-2000 h^{-1}, the weight of catalyst 0.5-5.0 g.

Main advantages

A green and sustainable route for the allyl alcohol production from glycerol over heterogeneous catalyst;
High catalytic activity;
One-step synthesis;
Cost-effective reaction;
Good eco-efficiency;
Cheap heterogeneous catalyst;
Atmospheric pressure;
No need H donor;
Gas-phase reaction;
Fixed-bed continuous flow reactor.

Key words

HZSM-5 catalysts; Gaseous glycerol conversion; Allyl alcohol production; Specialty bio-based chemicals.

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTING IN YOUR FUTURE

REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT